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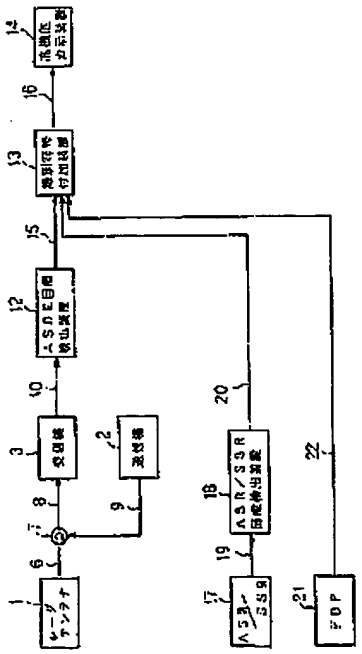
(54)【発明の名称】　空港面地上走行管制システム

(57)【要約】

【目的】　空港面を移動する目標を自動検出して識別符号を自動付加することにより、航空管制官の管制業務を軽減し、航空管制の安全性を向上するための空港面地上走行システムを得る。

【構成】　空港を走行する目標の探知を行う空港面探知レーダ１、２、３と、この空港面探知レーダの出力信号により目標を検出するＡＳＤＥ目標検出装置１２と空港の管制を行う空港監視レーダおよび航空機の応答信号を受信する２次監視レーダ１７と目標を検出するＡＳＲ／ＳＳＲ目標検出装置１８と航空機の飛行の計画データを蓄えるＦＤＰ２１からの信号に基づいて目標に識別符号を付加する識別符号付加装置と、目標を表示する高機能表示装置１４から構成される。



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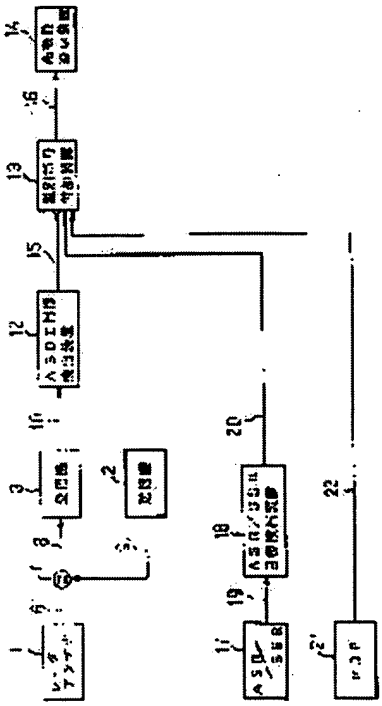
(54) AIRPORT SURFACE-GROUND RUNNING CONTROL SYSTEM



(57)Abstract:

PURPOSE: To reduce the burden of air control operations of an air controller to improve the safety of air control by automatically detecting a target moving on the airport surface to automatically add an identification mark to the target.

CONSTITUTION: Airport surface detection radars ASDE 1, 2, 3 detect a target running on the airport surface, and an ASDE target detection device 12 detects a target by means of an output signal 10 from the airport surface detection radar 3. An ASR/SSR target detection device 18 detects a target by an airfield control radar for controlling airport, and a secondary airport surveillance radar ASR/SSR 17 for receiving response signals from an aircraft. Further, based on a signal 22 from a FDP 21 for storing data on flight of an aircraft, an identification mark addition device 13 adds an identification mark to a target to display the target by a high function display device 14.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the aeronautical-navigation side taxing control system for controlling an aircraft, a car, etc. which run an aeronautical-navigation side.

[0002]

[Description of the Prior Art] Drawing 18 is Mitsubishi Electric technical report VOL.51. It is the functional block diagram showing NO.10PP 653-656 and the airport side detection radar (it is called "ASDE" below Airport Surface Detection Equipment.) shown in 1977 and 10. In order that the radar antenna with which 1 detects the inside of an airport side, and 2 may discharge an electric wave in drawing, a transmitter, The receiver with which 3 receives the electric wave discharged by the transmitter 2, and 4 change the input signal of a polar coordinate into a raster scan. The scan inverter outputted as a TV signal, daylight-display equipment with possible 5 expressing TV signal as high brightness, The circulator which switches the transmitted electric wave 9 outputted from the received electric wave 8 or transmitter 2 from a receiver which supplies 6 to the transceiver electric wave of a transmitter 2 or a receiver 3, and supplies 7 to an antenna 1, and 10 are the input signals of the polar coordinate received by the receiver. 11 is TV signal changed into the raster scan by the scan inverter 4.

[0003] Next, actuation is explained. The radar antenna 1 discharges the electric wave transmitted by the transmitter 2 in an airport side. A receiver 3 receives radar echoes, such as an aircraft

which moves in the inside of an airport side. The input signal 10 of the polar coordinate received by the receiver 3 is outputted to the daylight-display equipment 5 which is changed into a raster scan from a polar coordinate by the scan inverter 4, and performs TV display as a TV signal 11 with it, and daylight-display equipment 5 performs the daylight display of an analog for radar echoes, such as an aircraft.

[0004]

[Problem(s) to be Solved by the Invention] Although it was possible to have performed the daylight display of the analog according the aircraft etc. to a radar echo since the conventional ASDE was constituted as mentioned above, a target was not detected automatically or it did not have the function which adds an identification code, but it needed to control, collating with the sight of an airplane as which the controller who controls the aircraft is displayed on daylight-display equipment, and the identification code which the controller has memorized.

[0005] It was made in order that this invention might solve the above troubles, and it aims at improving the safety of mitigating an air traffic controller's control business and air-traffic control by detecting automatically the aircraft which moves in an airport side and carrying out automatic addition of the identification code.

[0006]

[Means for Solving the Problem] The airport side taxing control system concerning this invention The 1st target detection equipment which computes a target position based on the input signal of the airport side detection radar which detects the target which runs an airport, and said airport side detection radar outputted from this airport side detection radar, and outputs target positional information, The primary monitor radar which detects the target of an airport circumference air area, and the secondary surveillance radar which receives a target reply signal, The target-position information from said primary monitor radar, and the 2nd target detection equipment which outputs the positional information and beacon code information on target based on the input signal of said secondary surveillance radar outputted from said secondary surveillance radar, The location of a target and a target is decided based on the positional information outputted from the Flight-Plan-Message information processor which outputs the Flight-Plan-Message information on the aircraft, and the said 1st and 2nd target detection equipment. The identification code additional equipment which adds an identification code based on said beacon cord information and said Flight-Plan-Message information, and outputs target

positional information and a target identification code as an indicative data, It has the display which displays the symbol and identification code corresponding to a location and a target of the target which runs an airport side based on the indicative-data signal from this identification code additional equipment.

[0007] Moreover, the positioning system transmitter which transmits the target positional information and the identification code information on target which were carried in the target and computed based on the input signal from a positioning system satellite, The target position and identification code information from this positioning system transmitter are received. It has further the 3rd target detection equipment which decodes and outputs the positional information and identification code information on target to said discernment additional equipment. The location of a target and a target is decided based on the positional information from the said 1st and 3rd target detection equipment, an identification code is added based on said sign information from the 3rd target detection equipment, and target positional information and a target identification code are outputted as an indicative data.

[0008] Moreover, it has further the optical sensor which detects the non-detective region of said airport side detection radar, and the 4th target detection equipment which outputs target positional information to said identification code additional equipment based on the signal from this optical sensor, and the location of a target and a target is decided based on the positional information from the said 1st and 4th target detection equipment.

[0009] Moreover, the indicative data from said identification code additional equipment is inputted, and a future prediction location is computed based on location change of a target, when there is fear of a collision, it has further collision prediction equipment which outputs a collision prediction alarm signal to said highly efficient display, and a collision prediction alarm is told based on the collision prediction alarm signal from this collision prediction equipment.

[0010] Moreover, at least three SSR Mode S receivers which receive the SSR Mode S reply signal from the target from which it takes off, and output an input signal, Standardization of the target location is carried out based on the input signal from these SSR Mode S receivers. Have further location standardization equipment which outputs the positional information and beacon code information on target to said identification code additional equipment, and the location of a target and a target is decided based on the positional information from said location standardization equipment and said 1st target detection equipment. An identification code is

added based on the beacon cord information and said Flight-Plan-Message information from said location standardization equipment.

[0011]

[Function] In the airport side taxing control system concerning this invention The 1st target detection equipment computes a target position based on the input signal of an airport side detection radar, and target positional information is outputted. The 2nd target detection equipment The identification code additional equipment which outputs the positional information and beacon code information on target based on the input signal of the secondary surveillance radar outputted from the target-position information and the secondary surveillance radar from a primary monitor radar The location of a target and a target is decided based on the positional information outputted from the 1st and 2nd target detection equipment, an identification code is added based on beacon cord information and the Flight-Plan-Message information from a Flight-Plan-Message information processor, and target positional information and a target identification code are outputted as an indicative data. An indicating equipment displays the symbol and identification code corresponding to a location and a target of the target which runs an airport side based on an indicative-data signal.

[0012] Moreover, the target positional information and the identification code information on target which the positioning system transmitter was carried in the target and computed based on the input signal from a positioning system satellite are transmitted, and the 3rd target detection equipment receives and decodes a target position and identification code information, and outputs the positional information and identification code information on target to the discernment additional equipment. The location of a target and a target is decided based on the positional information from the 1st and 3rd target detection equipment, an identification code is added based on the sign information from the 3rd target detection equipment, and target positional information and a target identification code are outputted as an indicative data.

[0013] Moreover, an optical sensor detects the non-detective region of an airport side detection radar, and the 4th target detection equipment outputs target positional information to the identification code additional equipment based on the signal from an optical sensor. The location of a target and a target is decided based on the positional information from the 1st and 4th target detection equipment.

[0014] Moreover, collision prediction equipment inputs the indicative data from the

identification code additional equipment, computes a future prediction location based on location change of a target, when there is fear of a collision, it outputs a collision prediction alarm signal to a highly efficient display, and it tells a collision prediction alarm.

[0015] Moreover, at least three SSR Mode S receivers receive the SSR Mode S reply signal from the target from which it takes off, and location standardization equipment carries out standardization of the target location based on the input signal from a SSR Mode S receiver, and outputs the positional information and beacon code information on target to the identification code additional equipment. The location of a target and a target is decided based on the positional information from location standardization equipment and the 1st target detection equipment, and an identification code is added based on the beacon cord information and Flight-Plan-Message information from location standardization equipment.

[0016]

[Example]

One example of this invention is explained about drawing below example 1. Drawing 1 is the functional block diagram of the airport side taxing control system by one example of this invention. The ASDE target detection equipment which is the 1st target detection equipment which 12 judges the continuity of the radar echo of bearing and a range direction from the input signal 10 of ASDE, and detects a target in drawing, Bearing of the target for 15 to have been detected by ASDE target detection equipment, and the signal of distance, 13 to ASDE detection goals For example, the identification code additional equipment which adds identification codes, such as a call sign, An indicative-data signal for the highly efficient indicating equipment which displays the aircraft to which 14 moves the inside of an airport side, and 16 to display the location and identification number of the aircraft, 17 with question equipment (interrogator) from the airfield control radar (it is called "ASR" Airport Surveillance Radar and the following) which is a primary monitor radar which performs penetration of the aircraft which is in an airport circumference air area based on a radar echo, and control of a start, and the ground Transmit a sign pulse and it answers by the specific sign pulse with answerback (transformer border) in the aircraft. ASR/SSR which is the secondary surveillance radar (it is called "SSR" Secondary Surveillance Radar and the following) which carries out reception decode and identifies this, The ASR/SSR target detection equipment which is the 2nd target detection equipment in which 18 carries out target detection from the radar echo of ASR/SSR, ASR / SSR input signal whose 19 is

the radar echo of ASR and SSR, The signal of the beacon code information which is the code assigned to aircrafts, such as a reply signal by the location of the aircraft by which 20 was detected by ASR/SSR target detection equipment 18, and SSR, FDP which is the Flight-Plan-Message information processor (it is called "FDP" Flight Data Processing and the following) in which 21 stores databases, such as the flight root of the aircraft and a facilities name, and 22 are the data signals of the flight plan by FDP. The same sign as drawing 18 which shows the conventional example shows the same thing, and omits explanation.

[0017] The principle of operation is explained about drawing 1 , and 2 and 3. In a building, an aircraft, a car, etc. in an airport, each reflective pulse is changed into received power by the receiver 3 via an antenna 1, and the pulse of the submillimeter wave discharged via the antenna 1 from the transmitter 2 is outputted as an input signal 10. Moreover, an antenna 1 discharges the pulse of a submillimeter wave to 360-degree omnidirection, and the input signal of the direction of bearing for a pulse repetition period is obtained. Thus, an input signal 10 consists of two-dimensional signals of distance and bearing. From an input signal 10, the continuity of the amplitude of a range direction and the direction of bearing detects the aircraft etc. automatically according to the processing schematic diagram showing the magnitude of the amplitude of an input signal in drawing 2 with ASDE target detection equipment 12. In drawing, by magnitude judging processing of step S11, in amplitude detection processing of step S10, it detects for the purpose of the peak of the amplitude, and a target is judged as compared with the data to which the magnitude of the amplitude of a range direction and the direction of bearing is given beforehand, by target-position decision processing of step 12S, the center position of each target which carried out the target capital judging is computed, and a target is decided. Drawing 3 shows the relation between an aircraft target and an input signal, drawing 3 (a) and (c) show the peak of the amplitude of a radar echo, and drawing 3 (b) and (d) show the target aircraft. ASR/SSR17 receives the radar echo of the aircraft of an airport circumference air area, and the reply signal of the aircraft, and outputs an input signal. The ASR/SSR target detection equipment 18 which is the 2nd target detection equipment in which 18 carries out target detection from the radar echo of ASR/SSR outputs the location of the aircraft, and the signal of beacon code information based on the input signal of ASR/SSR17. FDP21 stores databases, such as the flight root of the aircraft, and a facilities name, and outputs the data signal of a flight plan. The aircraft detects information in case ASR / SSR target detection equipment 18 has the ability to detect

between an airport and an about 70 no Tikal mile as for ASDE target detection equipment 12 and it arrives and leaves ASR/SSR target detection equipment 18 for an airport less than the about 3 no Tikal mile from an airport.

[0018] Next, the processing schematic diagram of drawing 4 explains actuation of the identification code additional equipment 13. It sets to drawing, and since ASR/SSR and ASD are radars of a different kind, the ASDE target input process of step 20 and the ASR/SSR target input process of step 21 have the asynchronous timing of a data input, and since the resolution of the target position inputted also differs, they perform processing made the same. Next, in location correlation processing of step S22, the aircraft which makes the same each target detected by the radar of a different kind in consideration of the resolution of a different-species radar and timing, and lands sends a beacon from a self transponder to the question signal from SSR, until just before entering in an airport. On the other hand, since the aircraft suspends a beacon immediately after advancing into an ASDE land-cover and cannot detect the signal of SSR, either, it prepares the overlap field of ASR/SSR and ASDE, it detects the same model aircraft, by location correlation, decides a location on the aircraft of an ASDE land-cover, and transfers the management of a beacon cord to it. Since there is each error of the error range depending on the resolution specifically obtained as be alike with ASR/SSR target detection and the error range depending on the resolution obtained by SDE target detection, what whose core of the target by two kinds of radars corresponds, and exists within fixed limits that there is nothing in consideration of an error takes correlation of a location, in order to decide as the same target. In tailing processing of step S23, the target which correlation processing of a location ended is followed using tailing filters (for example, alpha-beta filter, a kalman filter, etc.). In identification code attached processing of step S24, about the aircraft target to have been able to take location correlation and for the beacon cord to have been placed under the authority of another department, it collates with the beacon cord memorized from FDP21 to the flight plan, and an aircraft facilities name etc. is added. By indicative-data creation processing of step S25, the aircraft identified by identification code attached processing of step S24 coding-izes positional information and an identification code, and outputs them as an indicative data 16.

[0019] The indicative data 16 outputted from the identification code additional equipment 13 is inputted into the highly efficient indicating equipment 14, and it displays an identification code while it graphic-symbol-izes a target with the drawing application software in which multi-

window-izing is possible and performs digital display. An example of this display is shown in drawing 5 .

[0020] As mentioned above, a target is detected automatically, an identification code is added automatically, while a target symbol-izes to a highly efficient indicating equipment and digital display is carried out to it, an identification code is displayed, the display screen can be legible, and a controller's business can be mitigated, and the safety of an airport can be improved.

[0021] In example 2. and the above-mentioned example 1, the aircraft can be detected automatically, although the system which adds an identification code was shown in the arrival aircraft, car location detection equipment 23 and the car loading GPS transmitter 24 can be connected [aircraft / drawing 6] so that it may be shown, and an identification number can also be added to the car which moves in the inside of an airport side.

[0022] Hereafter, this example is explained about drawing. Drawing 6 is the functional block diagram showing the airport side taxing system by this example. The car loading GPS transmitter which transmits self location and identification code in drawing in the car with which 24 carried the positioning system (it is called "GPS" below Groval Possitioning System.), The car target detection equipment which is the 3rd target detection equipment which 23 receives the location and identification code by the car loading GPS transmitter, and is detected, It is a car location and car number information for 26 to add a car location and a car number communication link electric wave to a car location, and for 25 add a car number, and the same sign as drawing 1 which shows an example 1 shows the same thing, and omits explanation.

[0023] Next, ** is just explained to drawing 6 and 8 for actuation. Although the radar echo of a car is detected as amplitude of an input signal 10 like the aircraft in ASDE target detection equipment 12, unlike the aircraft on which a car flies by the Flight Plan Message, there is no information on the identification code by the flight plan 22 from FDP21. In order to add an identification number to this car, as shown in drawing 8 , a GPS receiver is carried in a car, the car number to which the location computed from the time-of-day electric wave sent by the GPS Satellite using the principle of triangulation was assigned by the car in an airport is added, and it transmits with the car loading GPS transmitter 24 as a car location and a car number communication link electric wave 26. With car location detection equipment 23, a car location and the car number communication link electric wave 26 are received and decoded, and it outputs to the identification code additional equipment 13 as a car location and car number

information 25.

[0024] In the identification code additional equipment 13, collating by the radar echo by the car detected with ASDE target detection equipment like the example 1 and the location is performed, and a car location and a car number are outputted to the highly efficient display 14 as an indicative data 16. As specifically shown in the processing schematic diagram of drawing 8 , in the car target input process of step S30, processing made the same as that of the ASDE target input of step 20S and the ASR/SSR target input of step S21 is performed like an example 1. Next, in location correlation processing of step S22, since there are error range of the location obtained by car target detection equipment 23 and error range of the location obtained by ASDE target detection equipment 12, what whose target core corresponds and exists within fixed limits that there is nothing in consideration of an error takes correlation of a location as the same target. In tailing processing of step 23, the target which correlation processing of a location ended is followed using a tailing filter. ********** of a car is added in identification code attached processing of step S24. By indicative-data creation processing of step S25, the car identified by identification code attached processing of step 24 codes positional information and an identification code, outputs them to the highly efficient indicating-equipment appearance 14 as an indicative data 16, and performs the symbol display of ****** to graphic drawing. In addition, although the above processing explained the case of a car, about the aircraft, processing is performed like an example 1.

[0025] As mentioned above, since it is detected automatically and an identification code is added automatically, a car without the identification code information by the Flight-Plan-Message information processor can also mitigate a controller's business, and can improve the safety of an airport.

[0026] In addition, although this example showed the example which adds an identification number to the car which connects [example / 1] car location detection equipment and a car loading GPS transmitter, and moves in the inside of an airport side, it is applicable also to mobiles other than a car.

[0027] Although example 3. and the above-mentioned example 2 show the system which detects the aircraft and a car automatically and adds an identification code, as shown in drawing 9 , the blind area 51 and 52 which serves as a dead angle of the electric wave of the radar antenna 1 by building 50 grade may produce ASDE. Then, there is an advantage, such as not interfering with

the electric wave in an airport by being unable to leak, and also being able to supervise the inside of an airport and using an optical sensor, by connecting [drawing 10] the optical sensor 27 and blind target detection equipment 29 so that it may be shown. Hereafter, this example is explained about drawing. Drawing 10 is the functional block diagram showing the airport side taxing system by this example. In drawing, the same sign as drawing 1 which optical - electrical signal from which light was changed into 27 by optical sensors, such as a visible camera or a ****** camera, and 28 was changed into the electrical signal, blind target detection equipment according [29] to an image processing, and 30 are blind target-position signals, such as an aircraft which moves to a blind location, and shows an example 1 shows the same thing, and omits explanation.

[0028] Next, actuation is explained about drawing 10 and 11. the optical sensor 27 -- apron lighting -- it is installed in a column, an airport building, etc., and the field which serves as a dead angle with the radar antenna 1 is copied out, and it outputs to blind target detection equipment 29 as an optical-electrical signal 28. Moreover, blind target detection equipment 29 detects the target of the aircraft etc. using the image processing which carries out pattern recognition of the image pick-up image, converts it into the circumstances and the LAT in an airport, and is outputted to the identification code additional equipment 13 by making a target position into the blind target-position signal 30. concrete processing of target detection equipment 29 is shown in the processing schematic diagram of drawing 11 -- as -- video quantization processing of step S40 -- the optical sensor 27 -- A/D conversion of the image video signal acquired clitteringly is carried out, and it detects in image recognition processing of step S41 about a pixel with brightness change of the frame image of the frame of last time of day and the present time of day. Step S42 will be outputted as a target position, if a target is distinguished from magnitude, a rate, etc. and it is assumed as a target about a pixel with this brightness change.

[0029] In the identification code additional equipment 13, although it is the same as that of processing of an example 1, as a processing schematic diagram is shown in drawing 12 , the blind target input process of step S60 performs processing made the same as that of the ASDE target input of step S20, and the ASR/SSR target input of step S21. Next, since there are error range of the location obtained by blind target detection equipment 29 and error range of the location obtained by SDE target detection equipment 12 in location correlation processing of step S22 What whose core of each target corresponds and exists within fixed limits that there is

nothing in consideration of an error takes correlation of a location as the same target. It progresses to the following step S23, and the same processing as an example 1 is performed, positional information and an identification code are outputted to the highly efficient indicating-equipment appearance 14, and graphic drawing performs the symbol display of a target.

[0030] As mentioned above, since it cannot leak, and an airport side can be supervised and an optical sensor is used, it cannot interfere with the electric wave in an airport, and the safety of an airport can be improved further.

[0031] A near miss of an aircraft comrade and the car pair aircraft and the alarm of a collision can be told through the highly efficient display 14 by adding collision prediction equipment 31 to example 4. and the above-mentioned example 3. Hereafter, this example is explained about drawing. Drawing 13 is the functional block diagram showing the airport side taxing system by this example. In drawing, 31 is collision prediction equipment, 32 is a collision prediction alarm signal, and the same sign as drawing 1 which shows an example 1 shows the same thing, and omits explanation.

[0032] Next, drawing 14 explains actuation. Drawing 14 shows the processing schematic diagram of collision prediction equipment 31, in location prediction processing at step S50, based on the indicative data 16 including the location of the aircraft from the identification code additional equipment 13 etc., uses a tailing filter and predicts the scanning location of a degree about all the targets currently displayed on one scan. In course judging processing of step S51, the course of the future is judged from the location of the target past, a rate, acceleration, etc. In collision prediction processing of step S52, if the danger of a collision of the future is judged and there is danger of a collision of the future based on the information on step S51, a ****** prediction alarm signal will be outputted and an alarm will be told through the highly efficient display 14.

[0033] As mentioned above, since a controller is told about a collision prediction alarm through a highly efficient display, the safety of an airport can be improved further.

[0034] By connecting [example / example 5. and / above-mentioned] the SSR Mode S transmitter-receiver 33 and location standardization equipment 35, the location and beacon code of the aircraft of SSR Mode S loading can be detected, and an aircraft identification code can also be added also to the aircraft to leave. Hereafter, this example is explained about drawing. Drawing 15 is the functional block diagram showing the airport side taxing system by this

example. In drawing, the sign as drawing 1 with which location standardization equipment and 36 are a ground position and a beacon code signal, and an input signal and 35 indicate an example 1 to be with a SSR Mode S transmitter-receiver and 34 shows the same thing, and omits explanation. [same / 33]

[0035] Next, actuation is explained about drawing 15 , and 16 and 17. Since the aircraft by which SSR Mode S is carried can be asked individual, it gives a SSR Mode S question signal, it receives the reply signal with the SSR Mode S receiver 33 installed in at least three places, and outputs it to location standardization equipment 35 as an input signal 34. As shown in the processing schematic diagram of drawing 16 , in decipherment processing of the Mode S cord of step S60, location standardization equipment 35 decodes the reply signal of SSR Mode S, by the triangulation method using the arrival time interval of each input signal from the SSR Mode S receiver 33 installed in three places at step S61, carries out standardization of the target position, and outputs positional information and a beacon code. In the identification code additional equipment 13, although it is the same as that of processing of an example 1, as shown in a processing schematic diagram at drawing 17 , the SSR Mode S input process of step 61 performs processing made the same as that of the ASDE target input of step 20, the ASR/SSR target input of step 21, etc.

[0036] Next, since there are error range of the location obtained by location standardization equipment 35 and error range of the location obtained by ASDE target detection equipment 12 in location correlation processing of step S22 What whose target core corresponds and is that there is nothing in fixed field within the limits in consideration of an error takes correlation of a location as the same target. It progresses to the following step S23, and the same processing as an example 1 is performed, positional information and an identification code are outputted to the highly efficient indicating-equipment appearance 14, and graphic drawing performs the symbol display of a target, and the display of an identification code.

[0037] As mentioned above, since it is detected automatically and an identification code is added automatically, the target from which it takes off can also mitigate a controller's business, and can improve the safety of an airport more.

[0038]

[Effect of the Invention] As mentioned above, according to this invention, it is. The airport side detection radar which detects the target which runs an airport, The 1st target detection equipment

which computes a target position based on the input signal of said airport side detection radar outputted from this airport side detection radar, and outputs target positional information, The primary monitor radar which detects the target of an airport circumference air area, and the secondary surveillance radar which receives a target reply signal, The target-position information from said primary monitor radar, and the 2nd target detection equipment which outputs the positional information and beacon code information on target based on the input signal of said secondary surveillance radar outputted from said secondary surveillance radar, The location of a target and a target is decided based on the positional information outputted from the Flight-Plan-Message information processor which outputs the Flight-Plan-Message information on the aircraft, and the said 1st and 2nd target detection equipment. The identification code additional equipment which adds an identification code based on said beacon cord information and said Flight-Plan-Message information, and outputs target positional information and a target identification code as an indicative data, Since it had the display which displays the symbol and identification code corresponding to a location and a target of the target which runs an airport side based on the indicative-data signal from this identification code additional equipment Since a target is detected automatically and an identification code is added automatically, a controller's business can be mitigated and the safety of an airport can be improved.

[0039] Moreover, the positioning system transmitter which transmits the target positional information and the identification code information on target which were carried in the target and computed based on the input signal from a positioning system satellite, The target position and identification code information from this positioning system transmitter are received. It has further the 3rd target detection equipment which decodes and outputs the positional information and identification code information on target to said discernment additional equipment. The location of a target and a target is decided based on the positional information from the said 1st and 3rd target detection equipment. Since an identification code is added based on said sign information from the 3rd target detection equipment and target positional information and a target identification code are outputted as an indicative data Since it is detected automatically and an identification code is automatically added also by the target without the identification code information by the Flight-Plan-Message information processor, a controller's business can be mitigated and the safety of an airport can be improved.

[0040] Moreover, since it has further the optical sensor which detects the non-detective region of

an airport side detection radar, and the 4th target detection equipment which outputs target positional information to said identification code additional equipment based on the signal from this optical sensor and the location of a target and a target is decided based on the positional information from the said 1st and 4th target detection equipment, it cannot leak, an airport side can be supervised and the safety of an airport can be improved further.

[0041] Moreover, since it has further collision prediction equipment which outputs a collision prediction alarm signal to said highly efficient display and a collision prediction alarm is told based on the collision prediction alarm signal from this collision prediction equipment when the indicative data from said identification code additional equipment is inputted, a future prediction location is computed based on location change of a target and there is fear of a collision, the safety of an airport can be improved further.

[0042] Moreover, at least three SSR Mode S receivers which receive the SSR Mode S reply signal from the target from which it takes off, and output an input signal, Standardization of the target location is carried out based on the input signal from these SSR Mode S receivers. Have further location standardization equipment which outputs the positional information and beacon code information on target to said identification code additional equipment, and the location of a target and a target is decided based on the positional information from said location standardization equipment and said 1st target detection equipment. Since it is detected automatically and an identification code is added automatically, the target from which it takes off since an identification code is added based on the beacon cord information and said Flight-Plan-Message information from said location standardization equipment can also mitigate a controller's business, and can improve the safety of an airport.

CLAIMS

[Claim(s)]

[Claim 1] The airport side taxing control system characterized by providing the following The airport side detection radar which detects the target which runs an airport 1st target detection equipment which computes a target position based on the input signal of said airport side detection radar outputted from this airport side detection radar, and outputs target positional

information The primary monitor radar which detects the target of an airport circumference air area The 2nd target detection equipment which outputs the positional information and beacon code information on target based on the input signal of said secondary surveillance radar outputted from the secondary surveillance radar which receives a target reply signal, and the target-position information from said primary monitor radar and said secondary surveillance radar, The location of a target and a target is decided based on the positional information outputted from the Flight-Plan-Message information processor which outputs the Flight-Plan-Message information on the aircraft, and the said 1st and 2nd target detection equipment. The identification code additional equipment which adds an identification code based on said beacon cord information and said Flight-Plan-Message information, and outputs target positional information and a target identification code as an indicative data, The display which displays the symbol and identification code corresponding to a location and a target of the target which runs an airport side based on the indicative-data signal from this identification code additional equipment

[Claim 2] The positioning system transmitter which transmits the target positional information and the identification code information on target which were carried in the target and computed based on the input signal from a positioning system satellite, The target position and identification code information from this positioning system transmitter are received. It has further the 3rd target detection equipment which decodes and outputs the positional information and identification code information on target to said discernment additional equipment. The location of a target and a target is decided based on the positional information from the said 1st and 3rd target detection equipment. It is a taxing control system about the airport side of the 1st publication of a claim characterized by adding an identification code based on said sign information from the 3rd target detection equipment, and outputting target positional information and a target identification code as an indicative data.

[Claim 3] It is a taxing control system about the airport side according to claim 2 characterized by having further the optical sensor which detects the non-detective region of said airport side detection radar, and the 4th target detection equipment which outputs target positional information to said identification code additional equipment based on the signal from this optical sensor, and deciding the location of a target and a target based on the positional information from the said 1st and 4th target detection equipment.

[Claim 4] The port airport side taxing control system according to claim 3 which carries out [inputting the indicative data from said identification-code additional equipment, computing a future prediction location based on location change of a target, having further collision prediction equipment which outputs a collision prediction alarm signal to said highly efficient display, when there is fear of a collision, and telling a collision prediction alarm based on the collision prediction alarm signal from this collision prediction equipment, and] as the description.
[Claim 5] At least three SSR Mode S receivers which receive the SSR Mode S reply signal from the target from which it takes off, and output an input signal, Standardization of the target location is carried out based on the input signal from these SSR Mode S receivers. It has further location standardization equipment which outputs the positional information and beacon code information on target to said identification code additional equipment. The port airport side taxing control system according to claim 4 characterized by deciding the location of a target and a target based on the positional information from said location standardization equipment and said 1st target detection equipment, and adding an identification code based on the beacon cord information and said Flight-Plan-Message information from said location standardization equipment.